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CAPACITY ANALYSIS OF A FAMILY CARE CLINIC

USING COMPUTER SIMULATION TO DETERMINE OPTIMAL ENROLLMENT UNDER CAPITATED RESOURCE ALLOCATION CONSTRAINTS

A GRADUATE MANAGEMENT PROJECT SUBMITTED TO THE FACULTY OF THE U.S. ARMY-BAYLOR UNIVERSITY FOR SUCCESSFUL COMPLETION OF REQUIREMENTS FOR THE DEGREE OF MASTER OF HEALTH CARE ADMINISTRATION

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Acknowledgements

This effort to assist the Family Care Clinic staff in determining how they might best serve their customers in a capitated environment is dedicated to those same customers who walk through the clinic entrance on a daily basis and depend on us as healthcare professionals to meet their needs.

I attribute much of the value of this project to the support provided me by the staff of the Family Care Clinic and the Central Appointment Desk Supervisor who gave me free access and information critical to the understanding of their operations.

I gratefully extend thanks to the entire staff of the Lead Agent, TRICARE Southwest for giving me a welcome place to call home during my residency. Their willingness to share, to assist, and to create a meaningful residency is much appreciated. And a special thanks to my preceptor Colonel Rich Bannick, in whom I witnessed incredible talent and energy to reconstitute the professional performance and direction of the Lead Agent staff, MTF Commanders and Contractor through leadership, collaboration, and knowledge management. His compelling and unselfish desire to contribute to the continuous learning of Baylor students both past and present will long be remembered.

Finally I wish to thank my wife and children for their patient understanding and positive, encouraging support. These past two years of challenges, learning, and accomplishments would not have been possible without their help. Thank You.

Abstract

When implemented, Enrollment Based Capitation will forever change the manner that healthcare in the Military Health System is financed and delivered. Placing Military Treatment Facilities at capitated, financial risk will force Commanders and their staffs to become more acutely familiar with the healthcare needs of their enrollees and external customers, and of their own process for delivering healthcare services. The Twelfth Medical Group is the Air Force's largest freestanding ambulatory clinic in the United States, currently enrolled at 63 percent of its estimated 18,000 enrollee capacity. This project graphically simulates the operations of the Family Care Clinic and reports their financial and operational performance under capitation to identify the critical factors contributing to optimal enrollment.

Current capacity was tested using simulation and found to be insufficient for 18,000 enrollees due to the number and availability of providers to deliver care. Alternative models revealed the additional resources required to support 18,000 enrollees. The simulation models and resulting analysis provides the executive staff of the Twelfth Medical Group a dynamic analytical tool to assist in determining optimal enrollment of the Family Care Clinic under Enrollment Based Capitation. Tables presented throughout this document enable readers to view and manipulate the information in a spreadsheet environment. Recommendations and alternatives for delivering healthcare services to Family Care Clinic enrollees and external customers are presented.

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Introduction

The objective of this Graduate Management Project (GMP) is to conduct a capacity analysis of a Family Care Clinic Primary Care Manager (PCM) using computer simulation to optimize TRICARE Prime enrollment within Enrollment Based Capitation (EBC) resource allocation constraints. As of 1 July 1997, the Twelfth Medical Group (12th MDG), Air Education and Training Command (AETC), Randolph Air Force Base (RAFB), Texas reported the total Family Care Clinic PCM capacity as 18,000 enrollees, with a current enrolled population of 11,415 or 63 percent of capacity enrolled (Pleasants 1997). The 12th MDG is the Air Force's largest freestanding clinic located within the United States, and supports over 42,000 medically eligible Department of Defense (DoD) beneficiaries. Among all military TRICARE Primary Care Manager groups within the area of San Antonio, total enrollment for the three Primary Care Managers at 12th MDG is one of the highest. The desire to increase TRICARE Prime enrollment coupled with the advent of Enrollment Based Capitation (EBC), reduced operating budgets and reduced manpower as the Air Force Medical Service right-sizes makes it vital for the 12th MDG to determine what its optimum enrollment capacity is.

Conditions Which Prompted the Study

Beginning in Fiscal Year (FY) 1999, (October 1998 through September 1999), Enrollment Based Capitation is scheduled to serve as the methodology used by the Military Health System (MHS) to provide an enrollee-based allocation of funds to Military Treatment Facilities (MTFs). This methodology will establish full accountability by MTF Commanders for all health care resources used by TRICARE Prime enrollees, and provide greater flexibility in providing or purchasing high quality, appropriate, cost-effective health care. Under EBC, each TRICARE Prime enrollee represents a per member per month (PMPM) premium to be earned by the MTF, with additional revenues earned by providing care to external customers such as other enrollees, non-enrollees, and space available patients. Additionally, health care services purchased by an enrollee's Primary Care Manager will be charged to the referring MTF. This represents a significant change and challenge to the management of health care resources in the MHS, and requires a thorough analysis of current health care delivery methods in order to optimize enrollment and achieve sufficient resource allocation in a capitated environment. The MTF Scorecard, Figure 1, will be used to

monitor the projected and actual earnings and expenses for individual MTFs.

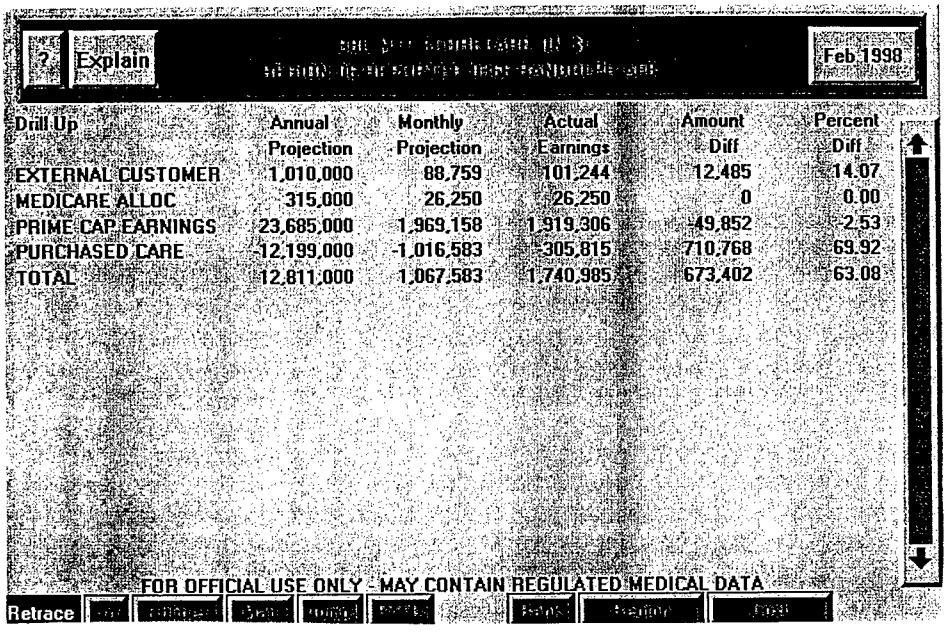


Figure 1 MTF Scorecard

The Office of Assistant Secretary of Defense (Health Affairs) (OASD)(HA) has developed the Enrollment-Based Capitation Program Linking Annual Network Needs and Enrollment Resourcing (EBC PLANNER) Version 1.3 software to assist MTF Commanders in analyzing, planning, and supporting the medical needs of their TRICARE Prime enrollees through the systematic review of resourcing issues which impact their mission and patient care demands on their facility. The discretionary use of the EBC PLANNER enables MTF Commanders to combine enrollee demographics, clinical practice and referral patterns, historical workload

capacity, patient utilization rates, and facility and mission constraints to determine optimum use of existing MTF capacity.

The Health Enrollment Assessment Review (HEAR) survey and the TRICARE Enrollment Data System (TEDS) were developed for TRICARE Region 6 to provide an accurate picture of health risk status, level of preventive services required, and identification of high cost enrollees to PCMs, but no validation on its ability to predict the level of medical resources demanded has yet been conducted. There are also several data and software limitations of the EBC PLANNER documented in its current version. Historical workload and cost data are based upon FY 1997, not current data, as are the inpatient practice patterns. Neither ambulatory practice patterns, based on mapping of Ambulatory Patient Groups (APGs) to Military Expense and Performance Reporting System (MEPRS) codes, nor patient utilization rates are MTF specific, and manpower requirements are based upon Air Force Manpower Standards (AFMS). Additionally, the EBC PLANNER requires iteration through multiple scenarios to obtain results which must be compared by hand, and optimum enrollment determined through trial and error. EBC does not account for the variability of patient demand as it is based on a steady-state, capacity driven or supply model, not demand for services.

EBC also derives an equivalent lives factor for determining MTF premiums earned based upon self-reported utilization frequency from the Health Affairs FY 96 Annual Beneficiary Survey among all users of the MHS, and not TRICARE Prime enrollees only. EBC equivalent lives are factored by age, gender, beneficiary category, military service affiliation, and martial status, and as such "contribute" premiums of varying amounts to the MTF or Primary Care Manager to which they are enrolled. Critical health care delivery decisions made by MTF Commanders based on comparing this type of output without the benefit of visualizing its impact on the day to day operations of the actual MTF can result in either an over-estimation or under-estimation of capacity . Under-estimation may result in lost enrollee premiums and marketing opportunities, unnecessary purchasing of care from other MTFs or the TRICARE Managed Care Support Contractor (MCSC), unfavorable bid-price adjustments (BPA's) with the MCSC, and possible utilization management decrements by OASD (HA). Over-estimation of capacity may result in an over-burdened medical and support staff, dissatisfied enrollees who may disenroll, increased purchases of care from other sources, and failure to meet DoD prescribed access to care standards.

This transition of the MHS to capitated resource allocation and its impact on the future delivery of health care services

makes computer simulation an ideal complimentary decision tool to evaluate current and alternative health care delivery processes, and attempt to optimize TRICARE Prime enrollment to obtain sufficient resource allocations.

Statement of the Problem

Resource allocation for the MHS has historically been based on previous workload and an estimated user population. EBC will provide a specific MTF allocation (PMPM premium) based upon a defined, enrolled population, with the possibility of additional revenue earned based on care provided to external customers, and expenses added to the MTF for care purchased for its TRICARE Prime enrollees by the PCM. The problem is that MTFs in the MHS have never operated in a true, capitated resource allocation environment.

Literature Review

The management of capacity in health care generally involves decisions concerning the acquisition and allocation of three types of resources: work force, equipment and facilities. Further, after resources are acquired and demand is forecasted, the scheduling process allocates available capacity to specific tasks and/or patients (Smith-Daniels, Schweikert, & Smith-Daniels 1988). The Secretary of the Air Force, like most of the military services uses manpower standards based on joint service standards

to quantify the manpower required to accomplish medical services. Air Force manpower standards are mathematical models which estimate beneficiary demand, determine human resource and facility capabilities, and enrollment capacity requirements (Secretary of the Air Force, 1997). Although not actively in use, a Joint Healthcare Productivity Assessment Model (JHPAM) was previously developed by the Joint Healthcare Management Engineering Team in 1995 to assist MTF's in formulating make/buy decisions and determining and distributing manpower requirements in a TRICARE environment. (Ayala 1997).

Air Force Manpower Standard (AFMS) 5223 dated 29 August 1997 applies to fixed Air Force MTF's directly involved in providing Family Practice/Primary Care Services in a peacetime environment. The AFMS 5223 uses a nine step application to determine the total manpower requirement, and the skill and grade mix needed to satisfy estimated demand. The Air Education and Training Command (AETC) also uses the Strategic Resource Portfolio Tool (SRPT) (version 3.0) developed by Vector Research Inc. to determine human and financial resource allocations to MTFs within its command and control based upon projected resource requirements under a variety of managed care utilization rate scenarios. The 12th MDG is presently staffed for FY 1998 according to the SRPT, and future manning requirements have been forecast based

upon Military and Civilian Personnel budgets provided by the Air Force Surgeon General and recorded in 12th MDG's 1997 Mission Support Plan. By FY 2001 the 12th MDG anticipates the loss of 30 total positions which will result in a savings in excess of $350,000 dollars (Pleasants 1997), however no impact on the current level of health care services by this reduction has been determined.

Work-force capacity is a function of the number of personnel hours available per unit of time and the composition of the work force in terms of the mix of employee skills (Smith-Daniels et al. 1988). Work-force acquisition and capacity decisions must consider such factors as the stochastic nature of health care demand, the difficulties in measuring provider productivity, substitution of different provider types, use of part-time employees to lower operating costs, and the use of overtime and temporaries to provide additional capacity. The linear programming or mathematical model used by the Air Force for determining resource allocations assumes that the utilization of medical services occurs at a constant level. Computer simulation differs from linear models in that it is event driven, such that a patient arrives at a clinic and requests medical care in a stochastic manner which represents the variability in the demand for health care. In simulation, a large number of events produce

observations which can be statistically tested for significance, and variables determined in order to understand how a system works (Harell, 1995). Computer simulation has advantages over mathematical models. In a Family Care Clinic, although patients are generally appointed, their demand for health care are random events which increases the potential for variation. Simulation enables the user to incorporate variations into the model which improve its accuracy and its usefulness as an analytical instrument.

Benneyan, Horowitz, and Terceiro recommended computer simulation to test operational changes in an organization. They state that computer simulation allows the manager to make decisions on more objective evidence without disrupting the operations of the organization (Benneyan, Horowitz, and Terceiro 1994). Also, simulation is more effective if it accounts for the dynamic nature of the system being studied (Dawson, Ulgen, O'Conner, and Sanchez 1994), and synergies among variables are best observed with a dynamic tool capable of simultaneously performing multiple operations (Dawson, Ulgen, O'Conner, and Sanchez, 1994). In computer simulation, a model of a process is developed, and a series of trial-and-error experiments are conducted in order to make assumptions about event outcomes over time (Levin, 1992).

Sumner and Hseih used computer simulation to determine the effect of the number of exam rooms, providers, patient demand, and examination time on resource utilization and provider and patient waiting times, and conducted a least-squares regression to predict exam room requirements (Sumner & Hsieh 1980). Shuman, Hardwick & Huber were successful in maximizing HMO enrollment subject to capacity and capital constraints using integer programming (Shuman, Hardwick, & Huber 1988). Allen, Ballash & Kimball used computer simulation for a Family Practice clinic and showed that the most critical factor affecting patient waiting time is provider capacity (Allen, Ballash & Kimball 1997). A valid computer model is a tremendous managerial and analytical tool, and changes to organizational processes can be quickly and objectively evaluated. The software utilized in this project was developed as a tool for management, and a planned byproduct of this study is to leave the 12th Medical Group Family Care Clinic with a model they can manipulate to continue evaluating health care delivery alternatives and making informed decisions before committing scarce resources.

In their early simulation of an Air Force Outpatient Clinic, Fetter and Thompson found that increasing the utilization of providers resulted in a corresponding increase in patient waiting times. At 90 percent utilization, the average workday for

providers was extended by 30 minutes, and some non-appointed patients were observed to wait up to eight hours to be seen (Fetter & Thompson 1965). Allen, Ballash & Kimball's simulation results mirrored this result (Allen, Ballash & Kimball 1997). Uneyo used simulation to determine the optimum composition of health care teams in a pediatric clinic using different demand levels and exam room configurations. The study found that demand levels impact the optimal team composition, that the optimal solution maximized the annual return of dollars, and the addition of examining rooms while holding staffing constant, provided only minimal effects on utilization. (Uneyo, 1974).

Levy, Watford & Owen state that a simulation model can be used to estimate the operational characteristics of a system, as well as the system's sensitivity to changes in the design variables without the cost of implementing the change (Levy, Watford & Owen 1989). Patient scheduling can be varied to optimize either capital or staff resources (Crillo & Wise 1996), and Allen, Ballash & Kimball showed that patient overbooking has a significant negative impact on total patient times in the clinic (Allen, Ballash & Kimball 1997). The challenge is to balance patient schedules and resource schedules so that resources and the facility are used efficiently but not overused, and waiting time is minimized. Maximization of limited capital

can also be achieved by varying the quanity and availability of resources. The lowest variable patient cost is a function of the amount of time staff in different job categories spend on an individual patient encounter. By assigning actual dollar figures to variables associated with time spent on a patient or task, computer simulation can evaluate variable costs per patient by incrementing the costs per patient as they flow through the health care process. In their simulation of an outpatient primary care clinic, Cirillo and Wise were able to increase overall capacity while remaining budget neuteral by changing the mix of providers (Cirillo et al. 1996).

Ritondo and Freedman support the development of a basic model that follows the flow of patients as the first step. As understanding improves, detail can be added to the model (Ritondo and Freedman 1993). Increased model detail generally results in greater client confidence, but researchers warn that models should only include as much detail as necessary to validate the model (Dawson, Ulgen, O'Conner and Sanchez 1994). Using MedModel® simulation software, Avery studied the effects of staffing and examination room adjustments on patient throughput in an obstetrical and gynecological clinic. Adding exam rooms alone had no significant effects on patient waiting time, however

the combination of staffing mix and additional exam rooms reduced patient waiting time and provided an optimal solution (Avery & Morin 1997). Mahachek recommends sensitivity analysis of variables to determine the impact on outcomes, and variables with low sensitivity to output should be approached differently than variables of high sensitivity (Mahachek 1992). The clear majority of researchers recommend the model be set up to reflect current operations which serves as a baseline or point of departure. From this point, one variable at a time should be changed while controlling for others (Mahachek 1992). This approach provides the organization visibility of the most significant variables which can be targeted first for improvement.

Dawson, Ulgen, Oconner, and Sanchez offer a new method for evaluating staff utilization. Traditionally, average utilization throughout some period is used to measure productivity. Dawson, Ulgen, Oconner, and Sanchez suggest analysis of the average, maximum, and minimum by hour (Dawson, Ulgen, Oconner, and Sanchez 1994). This more detailed analysis adds visibility of trends that are smoothed through averaging. Additionally, Dawson, Ulgen, Oconner, and Sanchez stress the importance of the objective in staff utilization analysis. When asked what the objective for utilization of staff is , managers may be inclined

to state: "100 percent." Dawson, Ulgen, Oconner, and Sanchez would argue that this goal is attainable if all but minimal staffing were eliminated. This minimal staff would be occupied for the entire day, but throughput would suffer (Dawson, Ulgen, Oconner, and Sanchez 1994). It is more realistic to target utilization within some range while minimizing patient turnaround time (Dawson, Ulgen, Oconner, and Sanchez 1994). A contemporary rule of thumb is 70% to 80% utilization (Templin 1990).

A critical step that is often overlooked in simulation projects is the definition of the client's needs and constraints (Gupta, Zoreda, Kramer 1971). It is important to establish the absolutes or constraints early so meaningful scenarios can be developed. Examples of such constraints may be budgets, waiting times, service levels, access standards, or quality indicators.

In their capacity analysis of a coronary care facility, Cohen, Hershey, and Weiss were able to predict the impact of resource allocation and capacity decisions on health care performance measures and the costs of care in an inappropriate setting (Cohen, Hershey & Weiss 1999). Version 3.5 of the MedModel® software has a costing feature which allows the user to monitor costs associated with enrollee movement throughout the

locations, entities, and resources within the simulation (PROMODEL 1996). This will be especially useful when evaluating the optimum capacity of the Family Care Clinic given resource allocation constraints.

Finally, there are generally three types of substitution of tasks among health care providers: 1) vertical and 2) horizontal interchangeability between personnel types, and 3) the substitutability of labor and technology (Smith-Daniels et al. 1988). Itig was successful in developing a linear programming model which illustrated the use of horizontal and vertical substitution among primary care specialists which maximized the services available to an HMO population subject to financial and physician availability constraints. (Smith-Daniels et al. 1988). Computer simulation has been widely used to predict the probable effects of health care management decisions on patient throughput, staffing mix, customer satisfaction, waiting times, and resource consumption.

Purpose

The purpose of this study is to identify, through computer simulation and analysis, the critical factors which contribute to the optimal TRICARE Prime enrollment capacity in the Family Care Clinic PCM. Computer simulation can be used to investigate many possible factors with particular attention focused on resource

utilization, system capacity, and capability. Computer simulation also allows health care executives to test new ideas for system design or improvement before committing the time and resources to build or alter the actual system. A valid and reliable computer model makes it possible to experiment with different operating strategies, designs and resource allocations to achieve the best results, running many differing scenarios in a compressed time mode. Results that would have previously consumed months of physical observation are returned in a matter of minutes and at a greatly reduced expense. This simulation model and the resulting analysis will enable the Twelfth Medical Group executive staff to evaluate capacity and capitation decisions for the future, and benchmark itself with like-size operations.

The model created for this project will simulate the utilization and provision of health care services within the Family Practice Clinic during the first four months of FY 1998 (i.e. October 1997 through January 1998). The objective of the study is to determine the optimum enrollment capacity under a capitated resource allocation methodology. The variables which contribute to optimum enrollment include the number of enrollees and their respective equivalent lives mix, enrollee utilization rate, premiums earned, capitation rate, reimbursement rate for

external customers, capacity enrolled, clinical services available within the MTF, provider ability, availability and efficiency, provider and support staff mix, outpatient visit costs, appointment scheduling process, patient waiting times, and enrollee purchased care.

Hypothesis

Null Hypothesis: Current capacity exists within the Family Care Clinic to enroll 18,000 eligible beneficiaries.

Alternate Hypothesis: Current capacity does not exist within the Family Care Clinic to enroll 18,000 eligible beneficiaries.

Methods and Procedures

This simulation draws from a population of TRICARE Prime enrollees enrolled to the Family Care PCM from 1 October 1997 through 31 January 1998 based upon the number derived from the Defense Eligibility Enrollment Registration System (DEERS). The number of TRICARE Prime enrollees at the Family Care Clinic in each of the months studied was obtained through the EBC MTF Equivalent Lives Summary Report in the Corporate Executive Information System (CEIS) which monitors monthly enrollment summary data reported by DEERS as shown in Figure 2. The report provides raw enrollment count, calculated equivalent lives enrollment, and capitated earnings for the MTF. The raw

enrollment count obtained was for enrollees for all PCMs at the Randolph Clinic.

? Explain — MTF EQUIVALENT LIVES SUMMARY / REGION 06 /AF/ 0366 RANDOLPH AFB — Mar 1998

Drill Up	0-17	S 18-44 F S 18-37 M	M 18-44 F M 18-37 M	45-64 F 38-64 M	65+	Total
F AD ARMY	0	0	1	0	0	1
F AD FAMILY MEMBE	2,466	193	2,336	269	0	5,264
F AD NAVY/USMC/NO	0	2	0	0	0	2
F RET AIR FORCE	0	10	17	32	0	59
F RET ARMY	0	0	2	4	0	6
F RET FAMILY MEMB	403	210	355	1,176	10	2,154
F RET NAVY/USMC/N	0	0	1	3	0	4
M AD AIR FORCE	0	411	1,494	1,047	0	2,952
M AD ARMY	0	1	0	1	0	2
M AD FAMILY MEMBE	2,488	180	135	111	0	2,914
M AD NAVY/USMC/N	0	6	14	1	0	21
M RET AIR FORCE	0	0	6	1,121	2	1,129
M RET ARMY	0	0	1	121	1	123
M RET FAMILY MEMB	415	193	3	24	0	635
M RET NAVY/USMC/	0	0	0	60	0	60
TOTAL	5,772	1,531	4,845	4,021	13	16,182

FOR OFFICIAL USE ONLY - MAY CONTAIN REGULATED MEDICAL DATA

Retrace

Figure 2 MTF Equivalent Lives Summary Report

The Managed Care Support Contractor for TRICARE Region Six provides a weekly Capacity Report to the Lead Agent which shows the current number of enrollees to each of the PCMs at the 12th MDG in the following categories: Active duty retirees and their families (RDO), Active duty family members (ADFM), and Active duty members (ADI). The Capacity Report for the period ending 6 February 1998 was used as shown in Figure 3.

CAPACITY REPORT FOR REGION 6 FOR WEEK ENDING (02/06/98)

	RDO	%	ADFM	%	ADI	%
RANDOLPH						
PEDS	221	110.50%	3281	104.16%	0	#DIV/0!
FCC	4009	89.09%	4771	68.16%	3337	51.34%
AEROSPACE MEDICINE	9	#DIV/0!	904	100.44%	850	60.71%

Figure 3 MCSC Capacity Report

To determine the number of raw enrollees to the Family Care Clinic PCM only, a percentage distribution of enrollees was calculated across all 12th MDG PCMs and all enrollee types based upon the population of enrollees served in each of the 12th MDG PCMs. The matrix of percentage distributions is shown in Table 1.

Table 1

Percentage Distribution of Enrollees Among PCMs

	Primary Care Manager		
Enrollee Type	PEDS	FCC	AEROSPACE MEDICINE
RDO	6%	94%	0%
ADFM	37%	53%	10%
ADI	0%	80%	20%

To calculate the distribution of raw enrollees among the EBC Equivalent Lives Beneficiary Groups within the Family Care Clinic PCM, the average number of raw enrollees in each of the months under study across all beneficiary groups obtained from the EBC MTF Equivalent Lives Summary Report was multiplied by the respective percentage in Table 1, and the result shown in Table 2. The accuracy of this resulting estimation is within 3% or 574 of all MCSC reported enrollees at the Randolph Clinic. Because the current MCSC uses a system other than DEERS to record and report TRICARE Prime enrollment, this number is considered an acceptable level of accuracy for the purposes of this simulation.

Table 2

Raw Enrollees by Equivalent Lives Category

	Data							
EL BENGROUP	AGE 0-17	AGE 18-37	AGE 18-37	AGE 18-44	AGE 18-44	AGE 38-6	AGE 45-6	AGE 65
"F AD AIR FORCE "	0	0	0	268	399	0	42	0
"F AD ARMY "	0	0	0	1	1	0	0	0
"F AD FAMILY MEM"	736	0	0	165	2076	0	243	0
"F AD NAVY/USMC/"	0	0	0	2	2	0	1	0
"F RET AIR FORCE"	0	0	0	8	17	0	30	0
"F RET ARMY "	0	0	0	0	2	0	4	0
"F RET FAMILY ME"	117	0	0	187	314	0	1070	10
"F RET NAVY/USMC"	0	0	0	0	1	0	3	0
"M AD AIR FORCE "	0	362	1258	0	0	841	0	0
"M AD ARMY "	0	1	0	0	0	2	0	0
"M AD FAMILY MEM"	756	152	122	0	0	100	0	0
"M AD NAVY/USMC/"	0	10	19	0	0	2	0	0
"M RET AIR FORCE"	0	0	7	0	0	1002	0	3
"M RET ARMY "	0	0	1	0	0	112	0	1
"M RET FAMILY ME"	118	181	3	0	0	21	0	0
"M RET NAVY/USMC"	0	0	0	0	0	53	0	3
Grand Total	1726	707	1409	631	2812	2131	1392	17

Outpatient workload (visits) for all enrollees during the first four months was obtained from the CEIS through an adhoc report created using the Trendstar Module. The requested fields of the report were: MTF - 12th Medical Group, TRICARE Prime Enrollees, Month of Visit in FY 98, Gender, EBC Benificiary Category Group, and Age. The report was compiled and placed on the CEIS server and available to registered users via the Trendpath Module as an unmapped report. The uppermost drill level of the report is shown in Figure 4.

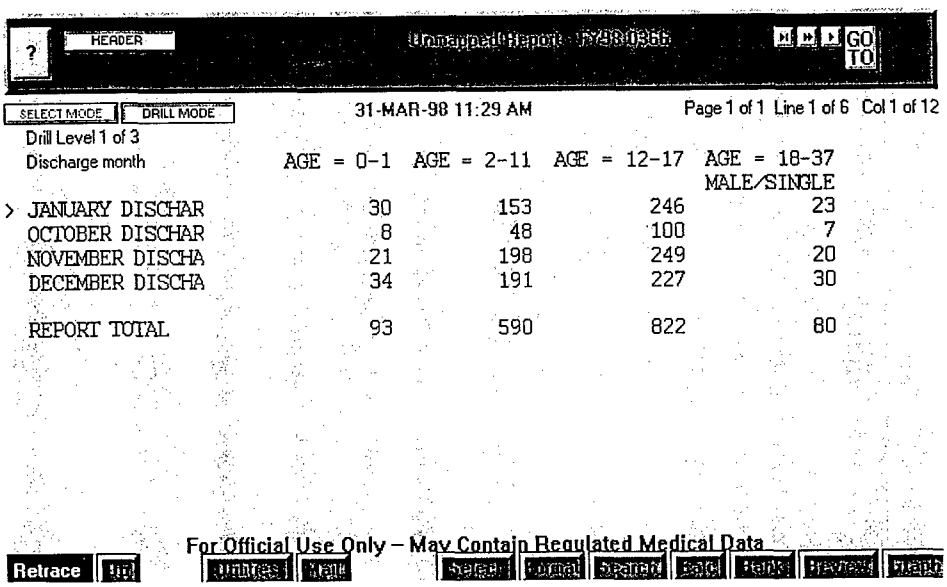


Figure 4 Enrollee OP Visits FY 98 by BENCAT for Randolph AFB

Outpatient visits for each of the Equivalent Lives Beneficiary Categories for the Family Care Clinic PCM was calculated by applying the same percentage distributions obtained in Table 1, and the relative resource utilization factors that apply to the development of Equivalent Lives in the EBC model by Health Affairs. The Equivalent Lives factors within the EBC Capitation Model normalize each enrollee's relative resource utilization across age groups, gender, martial status, service relationship, and beneficiary category. The current EBC Equivalent Lives Table and the corresponding factors is presented as Figure 5.

FEMALE: Ages	0-1	2-11	12-17	18-44S	18-45M	45-54	55-64	65-74	75up
AD Navy	0.0	0.0	1.04	1.04	0.85	1.20	1.20	1.35	2.07
AD AF	0.0	0.0	0.94	0.94	0.79	1.20	1.20	1.35	2.07
AD Army	0.0	0.0	1.29	1.29	1.11	1.20	1.20	1.35	2.07
AD Fam Mem	1.63	0.47	0.74	0.78	1.04	1.11	1.81	1.35	2.07
Ret Fam Mem	1.63	0.47	0.74	0.72	0.81	0.98	1.04	1.35	2.07
Ret Navy	0.0	0.0	0.0	1.23	1.29	1.34	1.41	2.09	2.46
Ret AF	0.0	0.0	0.0	1.23	1.29	1.34	1.41	2.09	2.46
Ret Army	0.0	0.0	0.0	1.23	1.29	1.34	1.41	2.09	2.46
MALE: Ages	0-1	2-11	12-17	18-37S	18-37M	38-54	55-64	65-74	75up
AD Navy	0.0	0.0	0.56	0.56	0.45	0.62	0.66	1.39	1.39
AD AF	0.0	0.0	0.46	0.46	0.42	0.55	0.66	1.39	1.39
AD Army	0.0	0.0	0.57	0.57	0.53	0.68	0.66	1.39	1.39
AD Fam Mem	1.71	0.60	0.64	0.32	0.60	0.80	0.87	1.39	1.39
Ret Fam Mem	1.71	0.60	0.64	0.42	0.30	0.80	0.87	1.39	1.39
Ret Navy	0.0	0.0	0.0	1.61	1.25	0.91	0.94	1.41	2.04
Ret AF	0.0	0.0	0.0	1.61	1.25	0.81	1.03	1.60	1.99
Ret Army	0.0	0.0	0.0	1.61	1.25	1.09	1.09	1.65	2.34

Figure 5 EBC Equivalent Lives Factors

Assuming the validity of the EBC Equivalent Lives Factors issued from Health Affairs is accurate, such that relative utilization of care is the same regardless of PCM assignment, total FY 98 Family Care Clinic enrollee visits were obtained by applying the percentage distributions in Table 1 to the total enrollee visits obtained through the CEIS adhoc report for each month under study and presented at Table 3. Visits from age groups 0-1, 2-11, and 12-17 from the adhoc report were combined under one age group 0-17 to correspond with the 0-17 Equivalent Lives Beneficiary Category in the EBC Capitation model.

Table 3

Family Care Clinic PCM Visits FY 98

EQUIVALENT LIVES BENIFICIARY GROUP	(All)

Data	Total
Sum of AGE 0-17	1519
Sum of AGE 18-37 SINGLE	68
Sum of AGE 18-37 MARRIED	134
Sum of AGE 38-64	1786
Sum of AGE 45-64	1746
Sum of AGE 18-44 SINGLE	152
Sum of AGE 18-44 MARRIED	884
Sum of AGE 65+	33

Average visits per month and per patient category were computed by summing the total visits, and dividing by the number of months under study. The resulting data provides an average utilization rate per month per EBC Equivalent Lives Beneficiary Category at the Family Care Clinic PCM for the first four months of FY 98, and shown in Table 4.

Table 4

Utilization Rate for Family Care Clinic PCM Enrollees FY 98

	Data							
EQUIVALENT LIVES BENIFICIAR	0-17	18-37 S	18-37 M	18-44 S	18-44 M	38-64	45-64	65+
"F AD AIR FORCE "	0.00	0.00	0.00	0.12	0.24	0.00	0.52	0.00
"F AD ARMY "	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"F AD FAMILY MEM"	0.31	0.00	0.00	0.05	0.08	0.00	0.32	0.00
"F AD NAVY/USMC/"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"F RET AIR FORCE"	0.00	0.00	0.00	0.18	0.25	0.00	0.57	0.00
"F RET ARMY "	0.00	0.00	0.00	0.00	0.27	0.00	0.47	0.00
"F RET FAMILY ME"	0.52	0.00	0.00	0.05	0.08	0.00	0.43	5.53
"F RET NAVY/USMC"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"M AD AIR FORCE "	0.00	0.05	0.03	0.00	0.00	0.30	0.00	0.00
"M AD ARMY "	0.00	0.00	0.00	0.00	0.00	1.41	0.00	0.00
"M AD FAMILY MEM"	0.24	0.02	0.01	0.00	0.00	0.25	0.00	0.00
"M AD NAVY/USMC/"	0.00	0.02	0.00	0.00	0.00	0.63	0.00	0.00
"M RET AIR FORCE"	0.00	0.00	0.11	0.00	0.00	0.26	0.00	15.33
"M RET ARMY "	0.00	0.00	0.53	0.00	0.00	0.35	0.00	4.75
"M RET FAMILY ME"	0.34	0.01	0.18	0.00	0.00	0.19	0.00	0.00
"M RET NAVY/USMC"	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.75
Grand Total	1.41	0.11	0.87	0.39	0.92	3.58	2.30	26.36

To determine the Family Care Clinic resources used per enrollee during FY 98, the number of visits per month obtained in Table 4 above was multiplied by the cost per outpatient visit provided by the 12th MDG MEPRS Report. The current FY 98 MEPRS

cost for outpatient visits in the Family Care Clinic is $118.76 per visit. The resulting calculation provides the average resources used per FCC PCM enrollee per year in FY 98, presented in Table 5 below.

Table 5

Average Resource Use per Year per FCC PCM Enrollee FY 98

	Data							
EQUIVALENT LIVES BENIFICIARY GROUP	0-17	18-37 S	18-37 M	18-44 S	18-44 M	38-64	45-64	65+
"F AD AIR FORCE "	$0.00	$0.00	$0.00	$164.85	$341.82	$0.00	$736.54	$0.00
"F AD ARMY "	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
"F AD FAMILY MEM"	$439.12	$0.00	$0.00	$67.06	$115.65	$0.00	$457.45	$0.00
"F AD NAVY/USMC/"	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
"F RET AIR FORCE"	$0.00	$0.00	$0.00	$252.68	$357.96	$0.00	$805.42	$0.00
"F RET ARMY "	$0.00	$0.00	$0.00	$0.00	$379.02	$0.00	$663.29	$0.00
"F RET FAMILY ME"	$744.92	$0.00	$0.00	$78.09	$116.88	$0.00	$617.82	$656.15
"F RET NAVY/USMC"	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
"M AD AIR FORCE "	$0.00	$65.87	$46.74	$0.00	$0.00	$428.40	$0.00	$0.00
"M AD ARMY "	$0.00	$0.00	$0.00	$0.00	$0.00	$2,004.08	$0.00	$0.00
"M AD FAMILY MEM"	$336.96	$32.79	$20.53	$0.00	$0.00	$360.20	$0.00	$0.00
"M AD NAVY/USMC/"	$0.00	$34.26	$0.00	$0.00	$0.00	$890.70	$0.00	$0.00
"M RET AIR FORCE"	$0.00	$0.00	$162.44	$0.00	$0.00	$371.20	$0.00	$1,820.99
"M RET ARMY "	$0.00	$0.00	$758.04	$0.00	$0.00	$493.68	$0.00	$564.11
"M RET FAMILY ME"	$481.71	$17.67	$252.68	$0.00	$0.00	$275.65	$0.00	$0.00
"M RET NAVY/USMC"	$0.00	$0.00	$0.00	$0.00	$0.00	$277.50	$0.00	$1,068.84
Grand Total	$2,002.70	$150.59	$1,240.43	$562.68	$1,311.35	$5,101.41	$3,280.52	$4,110.09

Capitation premiums earned per enrollee was determined by applying the current capitation rate for the 12th MDG of $1873.16 to the Equivalent Lives adjusted enrollees of the Family Care Clinic PCM. Each of the enrollee Benificiary Groups was multiplied by their relative Equivalent Lives factor to arrive at the number of Equivalent Lives enrolled with the Family Care

Clinic PCM. The premiums earned per enrollee in the Family Care Clinic PCM is shown in Table 6.

Table 6

Premiums Earned for Family Care Clinic PCM Enrollees FY 98

EL BEN GROUP	0-17	18-37 S	18-37 M	18-44 S	18-44 M	38-64	45-64	65+
"F AD AIR FORCE "	$0.00	$0.00	$0.00	$1,760.77	$1,479.80	$0.00	$2,247.79	$2,528.77
"F AD ARMY "	$0.00	$0.00	$0.00	$2,416.38	$2,079.21	$0.00	$2,247.79	$2,528.77
"F AD FAMILY MEM"	$1,386.14	$0.00	$0.00	$1,461.06	$1,948.09	$0.00	$3,390.42	$2,528.77
"F AD NAVY/USMC/"	$0.00	$0.00	$0.00	$1,948.09	$1,592.19	$0.00	$2,247.79	$2,528.77
"F RET AIR FORCE"	$0.00	$0.00	$0.00	$2,303.99	$2,416.38	$0.00	$2,641.16	$3,914.90
"F RET ARMY "	$0.00	$0.00	$0.00	$2,303.99	$2,416.38	$0.00	$2,641.16	$3,914.90
"F RET FAMILY ME"	$1,386.14	$0.00	$0.00	$1,348.68	$1,517.26	$0.00	$1,948.09	$2,528.77
"F RET NAVY/USMC"	$0.00	$0.00	$0.00	$2,303.99	$2,416.38	$0.00	$2,641.16	$3,914.90
"M AD AIR FORCE "	$0.00	$1,048.97	$842.92	$0.00	$0.00	$1,236.29	$0.00	$2,603.69
"M AD ARMY "	$0.00	$1,067.70	$992.77	$0.00	$0.00	$1,273.75	$0.00	$2,603.69
"M AD FAMILY MEM"	$1,198.82	$599.41	$1,123.90	$0.00	$0.00	$1,629.65	$0.00	$2,603.69
"M AD NAVY/USMC/"	$0.00	$1,048.97	$842.92	$0.00	$0.00	$1,236.29	$0.00	$2,603.69
"M RET AIR FORCE"	$0.00	$3,015.79	$2,341.45	$0.00	$0.00	$1,929.35	$0.00	$2,997.06
"M RET ARMY "	$0.00	$3,015.79	$2,341.45	$0.00	$0.00	$2,041.74	$0.00	$3,090.71
"M RET FAMILY ME"	$1,198.82	$786.73	$561.95	$0.00	$0.00	$1,629.65	$0.00	$2,603.69
"M RET NAVY/USMC"	$0.00	$3,015.79	$2,341.45	$0.00	$0.00	$1,760.77	$0.00	$2,641.16

To obtain the amount of Purchased Care by the parent enrollment MTF for enrollees in the Family Care Clinic PCM, the Purchased Care Report contained in the EBC MTF Scorecard Report was used. This care includes care purchased for enrollees from the Managed Care Support Contractor, other MTFs and Supplemental Care reported via CHAMPUS through the CHCS, ADS, and TRICARE

Support Office (TSO). The costs are further defined and reported by inpatient services purchased, outpatient services purchased, and pharmacy services purchased. To calculate the purchase cost per enrollee in the Family Care Clinic PCM, a percentage distribution of total FY 97 Purchased Care Costs among four patient categories reported in the Business Case Analysis Module of the EBC Planner for 12th MDG was applied to the reported Purchased Care data obtained from the CEIS for all Equivalent Lives Beneficiary Categories. The percentage distribution among the four patient categories in the EBC PLANNER is listed in Table 7.

Table 7

Percentage Distribution of Purchased Care for 12th MDG FY 97

Patient Type	Inpatient	Outpatient
Active Duty	10%	5%
Active Duty Families < 65	19%	15%
Others < 65	48%	40%
65+	23%	40%

The percentage distribution above was applied to the total Purchased Care Summary for all 12th MDG enrollees, and the relative share of Family Care Clinic PCM enrollees further deduced by applying the same methodology used to determine the number of Family Care Clinic PCM enrollees among all 12th MDG enrollees. The resulting Purchase Costs per Family Care Clinic PCM enrollee for FY 98 which combines inpatient, outpatient, and pharmacy services from all sources is shown in Table 8

Table 8

Average Purchased Care Costs per Family Care Clinic Enrollee FY 98

	Data							
EL BEN GROUP	AGE 0-17	AGE 18-37 S	AGE 18-37 M	AGE 18-44 S	AGE 18-44 M	AGE 38-64	AGE 45-64	AGE 65+
"F AD AIR FORCE "	$ -	$ -	$ -	$ 127.56	$ 127.56	$ -	$ 127.56	$ -
"F AD ARMY "	$ -	$ -	$ -	$ 127.56	$ 127.56	$ -	$ -	$ -
"F AD FAMILY MEM"	$ 255.11	$ -	$ -	$ 0.15	$ 255.11	$ -	$ 255.11	$ -
"F AD NAVY/USMC/"	$ -	$ -	$ -	$ 127.56	$ 127.56	$ -	$ 127.56	$ -
"F RET AIR FORCE"	$ -	$ -	$ -	$ 612.27	$ 612.27	$ -	$ 612.27	$ -
"F RET ARMY "	$ -	$ -	$ -	$ -	$ 612.27	$ -	$ 612.27	$ -
"F RET FAMILY ME"	$ 612.27	$ -	$ -	$ 612.27	$ 612.27	$ -	$ 612.27	$ 306.14
"F RET NAVY/USMC"	$ -	$ -	$ -	$ -	$ 612.27	$ -	$ 612.27	$ -
"M AD AIR FORCE "	$ -	$ 127.56	$ 127.56	$ -	$ -	$ 127.56	$ -	$ -
"M AD ARMY "	$ -	$ 127.56	$ -	$ -	$ -	$ 127.56	$ -	$ -
"M AD FAMILY MEM"	$ 255.11	$ 255.11	$ 255.11	$ -	$ -	$ 255.11	$ -	$ -
"M AD NAVY/USMC/"	$ -	$ 127.56	$ 127.56	$ -	$ -	$ 127.56	$ -	$ -
"M RET AIR FORCE"	$ -	$ -	$ 599.52	$ -	$ -	$ 599.52	$ -	$ 306.14
"M RET ARMY "	$ -	$ -	$ 599.52	$ -	$ -	$ 599.52	$ -	$ 306.14
"M RET FAMILY ME"	$ 599.52	$ 599.52	$ 599.52	$ -	$ -	$ 599.52	$ -	$ -
"M RET NAVY/USMC"	$ -	$ -	$ -	$ -	$ -	$ 599.52	$ -	$ 306.14
Grand Total	$ 1,722.02	$ 1,237.30	$ 2,308.78	$ 1,607.37	$ 3,086.88	$ 3,035.86	$ 2,959.32	$ 1,224.55

To determine the Family Care Clinic PCM rate of External Customer Care Earned, the data was obtained from the Actual Earnings reported in the EBC MTF Scorecard Report in CEIS. Actual Earnings were sorted by Managed Care Support Contractor Enrollee, Other MTF Enrollee, and Non-Enrollees for outpatient and pharmacy services provided. A percentage distribution was applied to attribute Actual Earnings among the 12th MDG PCMs based upon the estimated amount of External Customers, or "Space Available" customers seen. Based on the previous distribution of patient categories served by the PCMs, it was determined that the Family Care Clinic sees nearly all the external customers who are not enrolled to one of the PCMs at 12th MDG.

Based on that assumption, the Actual Earnings reported in CEIS were attributed directly to the Family Care Clinic PCM, and total Non-Enrolled Outpatient Earnings divided by the EBC determined incremental cost for a visit of $44.99 per visit to arrive at an estimated number of external customers or "space available" customers seen each month. Estimated External Customer Earnings for the Family Care Clinic PCM per month are reported in Table 9. Estimated External Customer Family Care Clinic PCM visits per month are reported in Table 10.

Table 9

Family Care Clinic PCM Estimated External Customer Earnings FY 98

TYPE OF SERVICE	(All)

Sum of EARNINGS	MONTH				
SOURCE OF EARNINGS	JANUARY	OCTOBER	NOVEMBER	DECEMBER	Grand Total
MCSC ENROLLEE	5107	679	5579	6108	17473
NON ENROLLED	89642	15405	66874	70442	242363
OTHER MTF ENROLLEE	32083	26777	31082	32617	122559
Grand Total	126832	42861	103535	109167	382395

Table 10

Estimated External Customer Visits Per Month FY 98

Sum of VISITS	MONTH				
SOURCE OF VISIT	JANUARY	OCTOBER	NOVEMBER	DECEMBER	Grand Total
MCSC	20	15	20	15	70
NON ENROLLED	337	342	341	313	1333
OTHER	599	595	547	584	2325
Grand Total	956	952	908	912	3728

Provider availability for care was determined by analyzing their appointment templates, appointment types, the method for scheduling patients, and time not available for patient care. Each of the ten existing provider schedules were converted from

standard CHCS appointment templates in the Patient Appointment and Scheduling (PAS) Module of CHCS provided by the 12th MDG Central Appointment Desk (CAD) Supervisor to a dynamic spreadsheet in Microsoft Excel. Data fields included; Provider Name, Day of the Week, Appointment Time, Type of Appointment, and Duration of Appointment.

The original appointment templates from CHCS included time allotted to non-patient care such as Administrative Time, Preceptor Time spent among physicians and non-physicians, Telephone Consults, Lunch, Meetings, and Professional Training and Development, and were recorded on the spreadsheet as well. The resulting spreadsheet provided a useful analytical tool for viewing all or any of the combinations of appointment types, provider availability, and the number of appointments available. Appendix 1 defines the terms used in the appointment templates, and Table 11 is a sample of the spreadsheet developed for analyzing the appointment process and determining provider availability for patient care.

Table 11

Family Care Clinic Provider Schedule

Provider	(All)
Time	(All)

Count of Duration	Appt Type										
Day	AD	ADM	ADSC	FOL	NFP	PREC	ROU	SDA	SDWI	TEL	Grand Total
Monday	38	3	24	26	14	34	84	21	2	34	295
Tuesday	30	2	24	25	16	36	68	38	2	33	297
Wednesday	35	3	24	25	15	35	81	21	2	32	289
Thursday	40	2	25	26	13	35	85	21	2	34	302
Friday	37	3	24	26	2	35	98	21	2	34	300
Saturday								7			7
Thursday PCC	37	5	23	25	8	24	62	15		19	248
Thursday Pro	40	10	21	20	7	32	77			12	247
Thursday PRSTF			2			2		16		1	23
Thursday QA	40	4	23	24	7	24	64	15		20	251
Thursday Sfty	3		2	2	2	3	7			3	25
Grand Total	300	32	192	199	84	260	626	175	10	222	2284

The Family Care Clinic compiled a provider summary of time spent on patient and non-patient care over the course of three months during the period under study which accounted for that time recorded in the appointment templates plus non-availability due to leave and professional travel, additional duties, required military training, and illness. A spreadsheet was constructed which recorded this additional time not available for patient care, and computed the average percentage of duty time not available for each of the categories, hours and minutes not available per day, and the total time in minutes per day not

available for patient care. This data is reflected in Table 12, and was added to the scheduled time not available for patient care from Table 11 above.

Table 12

Total PCM Time Not Available for Patient Care FY 98

PROVIDER	(All)
MONTH	(All)

Data	Total	AVG MIN / MO	HRS/DAY	MIN/DAY
Sum of LEAVE/TDY	570	190	18	1060
Sum of MTG	107	36	3	199
Sum of ADDT'L DUTY	45	15	1	84
Sum of MIL TRNG	123	41	4	229
Sum of ILLNESS	57	19	2	106

Patient processing time and flow was observed over the course of three randomly selected periods during the study period, with the following areas observed; Outpatient Records, Family Care Clinic Reception Desk, and Patient Screening Rooms. Since all Family Care Clinic appointments are pre-scheduled except during Sick Call hours, a minimum number of patients must pick up their records from the Outpatient Records Office. A mean time of 4 minutes was calculated for the time for all patients at the Outpatient Records Desk.

The personnel assigned to the Clinic Reception Desk process arriving patients by ensuring availability of the patient health record, preparing ADS Patient Encounter Forms and Standard Form 600 Medical Forms, and verifying currency of patient Other Health Insurance (OHI) forms. In addition they are responsible for answering incoming phone calls, recording Telephone Consult requests for providers, and answering emergency telephones and dispatching ambulance personnel if required. A mean time of 4 minutes was calculated for processing arriving patients at the Reception Desk. Further detailed observation of the Reception Desk and the utilization of its personnel was not undertaken, although important, was not considered part of this capacity analysis.

Patient Screening consisted of obtaining and recording vital signs and indicating the nature of the visit on the SF 600. The mean observed time was 4 minutes among a total of 2-3 Screening Rooms observed and several different Medical Technician Screeners. The Medical Technicians attached to the Family Care Clinic have several other clinical and administrative duties, among them assisting with minor surgeries and clinical procedures, as well as performing as chaperones during examinations of patients with different gender providers.

Phase one of the capacity analysis involved construction of a base simulation model which measured the appointment capacity of the Family Care Clinic using the current provider and staff mix and their availability for patient care, as well as the arrivals and processing of FY 98 TRICARE enrollees and their corresponding contributions to premiums earned, purchased care costs, enrollment capacity, and resources used. Variables were assigned in the model which captured and reported results to the simulated EBC MTF Scorecard. Sixteen replications of a simulated operating week was run in order duplicate the current operations over the period of study and determine the number of appointments available to enrollees. Validation of the model was accomplished via direct observation of the simulation by the 12th MDG staff.

A second simulation using 18,000 TRICARE Prime enrollees vice the full capacity enrollee model depicted in the Appendix with the same attributes and utilization behaviors was run similarly to compare the same variables under analysis.

Alternative scenarios were developed and simulated using the 18,000 TRICARE Prime enrollees as a constant to determine if alternative resource or location mixes might satisfy the demand from 18,000 enrollees. Additionally, alternative scenarios were developed and simulated which held the current resource and location mix constant to determine the true enrollment capacity

at the Family Care Clinic. It is hoped that the final model can be used by Family Practice Clinic personnel in the future to evaluate alternative scenarios using various mixes of entities, locations, resources, and costs to simulate what-if answers to dynamic changes in personnel, enrollees, and costs, while providing the patient with access to high quality, cost-efficient care.

RESULTS

The study found that the current capacity in the Family Care Clinic will support 13,450 total enrollees, 2,560 more than the 10,890 studied during this observation period. The critical factors contributing to enrollment capacity are: the number and availability of providers, enrollee utilization rate, duration of visit, and priority for enrollment.

Table 13 shows the average number of provider hours not available for patient care. When added to the existing blocked time on appointment schedules for telephone consults and preceptor time, the average provider time not available for patient care per day is 2.8 hours. This factor determined the average number of patient appointments available per day.

Table 13

Average Provider Hours Not Available for Patient Care

PROVIDER	(All)
MONTH	(All)

Data	Total
Average of LEAVE/TDY	19
Average of MTG	3.57
Average of ADDT'L DUTY	1.5
Average of MIL TRNG	4.1
Average of ILLNESS	1.9

Table 14 shows the average duration in minutes of appointments by scheduled appointment type in the Family Care Clinic. The majority of the scheduled appointments were for twenty minutes, and thus used for capacity analysis and simulation modeling purposes.

Table 14

Average Duration of Appointments in Minutes

Average of Duration	
Appt Type	Total
AD	20
ADSC	27
FOL	19
MSR	30
NFP	25
PAPA	30
PAPD	41
ROU	20
ROUPA	32
ROX	40
SDA	19
WMI	30
Grand Total	24

Patient appointments available was determined by dividing provider available hours by the Family Care Clinic's standard twenty minute appointment block. Table 15 shows the number of twenty minute patient appointments available by day of the week.

Table 15

Patient Appointments Available

Sum of Appointments Available	
Day of Week	Total
Monday	143
Tuesday	142
Wednesday	129
Thursday	123
Friday	143
Saturday	7
Grand Total	687

Table 16 shows the average visits per year per enrollee category within the Family Care Clinic. This factor determined demand for appointments from enrollees. Based on provider availability, 32,640 appointments are available each year. Based on enrollee utilization, 25,288 appointments are required to support 10,890 enrollees. This leaves an unused capacity of 8,352 appointments per year or 696 appointments per month.

Table 16

Enrollee Demand for Appointments

	Data							
EL BEN GROUP	AGE 0-17	AGE 18-37 S	AGE 18-37 M	AGE 18-44 S	AGE 18-44 M	AGE 38-64	AGE 45-64	AGE 65+
"F AD AIR FORCE "	0.00	0.00	0.00	1.39	2.88	0.00	6.20	0.00
"F AD ARMY "	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"F AD FAMILY MEM"	3.70	0.00	0.00	0.56	0.97	0.00	3.85	0.00
"F AD NAVY/USMC/"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"F RET AIR FORCE"	0.00	0.00	0.00	2.13	3.01	0.00	6.78	0.00
"F RET ARMY "	0.00	0.00	0.00	0.00	3.19	0.00	5.59	0.00
"F RET FAMILY ME"	6.27	0.00	0.00	0.66	0.98	0.00	5.20	5.53
"F RET NAVY/USMC"	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
"M AD AIR FORCE "	0.00	0.55	0.39	0.00	0.00	3.61	0.00	0.00
"M AD ARMY "	0.00	0.00	0.00	0.00	0.00	16.88	0.00	0.00
"M AD FAMILY MEM"	2.84	0.28	0.17	0.00	0.00	3.03	0.00	0.00
"M AD NAVY/USMC/"	0.00	0.29	0.00	0.00	0.00	7.50	0.00	0.00
"M RET AIR FORCE"	0.00	0.00	1.37	0.00	0.00	3.13	0.00	15.33
"M RET ARMY "	0.00	0.00	6.38	0.00	0.00	4.16	0.00	4.75
"M RET FAMILY ME"	4.06	0.15	2.13	0.00	0.00	2.32	0.00	0.00
"M RET NAVY/USMC"	0.00	0.00	0.00	0.00	0.00	2.34	0.00	9.00
Grand Total	16.86	1.27	10.44	4.74	11.04	42.96	27.62	34.61

Across all active duty beneficiary groups, average utilization for females was 2.8 visits per year, and 2.1 for males. Across all retiree beneficiary groups, average utilization for females and males was 3.9 visits per year. The average utilization of 3.25 visits per year for active duty members only was used in computing the number of additional enrollees to be empaneled since the 12th MDG must enroll all of its active duty members. Alternatively, Table 17 depicts the number of additional enrollees in each of the patient categories who could be empaneled to the Family Care Clinic based upon their

historical utilization rate and the current supply of excess appointment capacity.

Table 17

Additional Enrollees by Patient Category

	Data							
EL BEN GROUP	AGE 0-17	AGE 18-37 S	AGE 18-37 M	AGE 18-44 S	AGE 18-44 M	AGE 38-64	AGE 45-64	AGE 65+
F AD AIR FORCE	0	0	0	13202	6372	0	2960	0
F AD ARMY	0	0	0	0	0	0	0	0
F AD FAMILY MEM	4960	0	0	32771	18919	0	4766	0
F AD NAVY/USMC/	0	0	0	0	0	0	0	0
F RET AIR FORCE	0	0	0	8615	6097	0	2706	0
F RET ARMY	0	0	0	0	5752	0	3283	0
F RET FAMILY ME	2926	0	0	27806	18726	0	3529	0
F RET NAVY/USMC	0	0	0	0	0	0	0	3318
M AD AIR FORCE	0	33367	47056	0	0	5083	0	0
M AD ARMY	0	0	0	0	0	1087	0	0
M AD FAMILY MEM	6461	65542	107952	0	0	6056	0	0
M AD NAVY/USMC/	0	0	0	0	0	2446	0	0
M RET AIR FORCE	0	0	13395	0	0	5863	0	1197
M RET ARMY	0	0	2876	0	0	4411	0	3863
M RET FAMILY ME	4520	122346	8615	0	0	7910	0	0
M RET NAVY/USMC	0	0	0	0	0	7842	0	2039

Table 18 depicts the average capitated revenue contribution to the Family Care Clinic under EBC based upon premiums earned minus purchased care and resources used for enrollees. Although the 12th MDG cannot discriminate amongst who it enrolls, these values are important in understanding the financial impact that each type of enrollee has on the clinic's overall resources.

Table 18

Annual Profit (Loss) Per Enrollee FY 98

	Data							
EL BEN GROUP	AGE 0-17	AGE 18-37	AGE 18-37 M	AGE 18-44 S	AGE 18-44 M	AGE 38-6	AGE 45-64	AGE 65+
"F AD AIR FORCE "	$ -	$ -	$ -	$ 68.09	$ (212.89)	$ -	$ 555.11	$ -
"F AD ARMY "	$ -	$ -	$ -	$ 723.69	$ 386.52	$ -	$ -	$ -
"F AD FAMILY MEM"	$ (306.55)	$ -	$ -	$ (231.62)	$ 255.40	$ -	$ 1,697.73	$ -
"F AD NAVY/USMC/"	$ -	$ -	$ -	$ 255.40	$ (100.50)	$ -	$ 555.11	$ -
"F RET AIR FORCE"	$ -	$ -	$ -	$ 611.30	$ 723.69	$ -	$ 948.47	$ -
"F RET ARMY "	$ -	$ -	$ -	$ -	$ 723.69	$ -	$ 948.47	$ -
"F RET FAMILY ME"	$ (306.55)	$ -	$ -	$ 611.30	$ (175.43)	$ -	$ 255.40	$ 836.08
"F RET NAVY/USMC"	$ -	$ -	$ -		$ 723.69	$ -	$ 948.47	$ -
"M AD AIR FORCE "	$ -	$ (643.72)	$ (849.76)	$ -	$ -	$ (456.40)	$ -	$ -
"M AD ARMY "	$ -	$ (624.98)	$ -	$ -	$ -	$ (418.94)	$ -	$ -
"M AD FAMILY MEM"	$ (493.86)	$ (1,093.27)	$ (568.79)	$ -	$ -	$ (63.04)	$ -	$ -
"M AD NAVY/USMC/"	$ -	$ (643.72)	$ (849.76)	$ -	$ -	$ (456.40)	$ -	$ -
"M RET AIR FORCE"	$ -	$ -	$ 648.77	$ -	$ -	$ 236.67	$ -	$ 1,304.37
"M RET ARMY "	$ -	$ -	$ 648.77	$ -	$ -	$ 349.06	$ -	$ 1,398.03
"M RET FAMILY ME"	$ (493.86)	$ (905.96)	$ (1,130.74)	$ -	$ -	$ (63.04)	$ -	$ -
"M RET NAVY/USMC"	$ -	$ -	$ -	$ -	$ -	$ 68.09	$ -	$ 948.47
Grand Total	$ (1,600.82)	$ (3,911.65)	$ (2,101.52)	$ 2,038.16	$ 2,324.19	$ (803.99)	$ 5,908.76	$ 4,486.95

Based upon the current 12th MDG goal of 18,000 enrollees, and its inability to discriminate amongst applicants, an average utilization rate of 3.1 visits per year was used to calculate the additional providers required by the Family Care Clinic based upon their current availability for patient care. Additional enrollment of 490 retirees, 2228 active duty family members, and 491 active duty members would require 3.3 additional providers.

Discussion

As demonstrated in the research methodology and results, there were many variables involved in answering the primary

research question of determining enrollment capacity for the Family Care Clinic. The calculation of enrollee visits, utilization rate, resource use, premiums earned, purchased care, and provider availability were all essential in evaluating capacity in a capitation scenario. Although not totally refined, the data which exists within the Corporate Executive Information System was extremely valuable in this research. The ability to analyze data at the enrollee only level will provide long term benefits in the future design and delivery of healthcare to enrollees in the MHS. Once enrollee data can be separated by clinic and individual PCM, the data will have that much more value in evaluating individual provider practices, clinic operations, and patient outcomes.

The determination of utilization rates for enrollees in the Family Care Clinic will be useful to both providers and management personnel in developing targeted utilization management programs for individual patient groups. With this information, decisions regarding the proper mix of enrollees to assign to individual providers or provider teams can be more accurately determined. The financial impact of resource usage by individual beneficiaries or beneficiary groups can also be used from the results of this study to assist clinical and management personnel in evaluating alternative sources of care. Annual

premiums earned by enrollees will help MTF Commanders in evaluating both the capitation rate established for their facility as well as its sufficiency to meet the demands of the respective enrollee types. The combined affects of utilization rates, resource use, premiums earned, and purchased care per enrollee might also be useful in further refinement of the Equivalent Lives factors established by Health Affairs. This project is by no means a validation of those factors, but allows those unfamiliar with the concept to see the impact on healthcare operations and the level of risk assumed under capitation.

The approximation of purchased care per enrollee provides the Family Care Clinic information that is useful in looking at the full spectrum of care required by their enrollees. Under capitation, Primary Care Managers can no longer limit their concerns to just outpatient care, but instead manage the enrollees' entire health through the appropriate purchase of required care from other sources. Much of the realization of this project and the most significant impact on determining enrollment capacity in a capitated environment comes from the analysis of provider scheduling and availability. Provider availability is the most critical factor affecting enrollment capacity. Whatever decisions are made regarding the targeted or finite enrollment capacity for a clinic or individual provider

will directly impact the provider and their availability for patient care.

This study analyzed only one of the three clinic PCMs at 12th MDG which may not account for interdependencies among the PCMs. Ancillary support processes were not studied separately, rather their costs included as part of total outpatient visit cost recorded in MEPRS. Absolute beneficiaries enrolled (and the associated PCM's premiums earned and capacity enrolled) may be different than simulated enrollees due to 1) separate enrollee databases used by the MCSC and as reported to CEIS via DEERS, and 2) EBC enrollee reporting in the Resource Module of CEIS by Equivalent Lives for the entire MTF only. Actual enrollee utilization, resource costs, and purchase costs may be different than simulated enrollees since data used was that actually "reported" to CEIS by 12th MDG via the creation and reconciliation of a Standard Ambulatory Data Record (SADR) through the Ambulatory Data System (ADS). Non-enrollees were not studied in order to control for the health care utilization practices and impact of TRICARE Prime enrollees. There may also be differences in access and utilization of care between enrollees and non-enrollees based upon their priority for care within the MHS. Finally, due to the frequent rotation of active duty military personnel and their families, those enrollees

represented in the FY 1998 sample to date may not be representative of the entire FY 1998 population.

Under Enrollment Based Capitation, MTF Commanders will continue to struggle with providing accessible, cost-effective care to their enrollees with limited availability and numbers of providers. The added risk of assuming full responsibility for the care of enrollees is further complicated for those MTFs providing outpatient services exclusively. With an increasing optempo of military medical deployments and reductions in medical providers due to decreasing active duty strength and budget reductions, the Air Force Medical Service faces a difficult period in meeting the demands of eligible beneficiaries.

Alternative methods for providing care, and evaluation of the methods for delivering that care at the best price, at the best place and at the best time must be continually monitored and reviewed. This study shows that the staff of the Family Care Clinic at 12th MDG has the current capacity to enroll a total of 13,450 beneficiaries, far short of its goal of 18,000. The simple solution to this problem might be to require Family Care Clinic providers and their respective support staff to work additional hours to meet the demands of a larger enrollment population. In fact, from this study, with an average utilization rate per enrollee of 3.1 visits per year, one hour of

additional provider availability per day would allow the enrollment of one additional enrollee. By extending clinic hours of operations, or scheduling meetings, preceptor time, and telephone consults after hours, the clinic could recapture much provider availability for patient care. Even the reduction of appointment duration from 20 minutes to 15 minutes could increase the average number of appointments per day from 136 to 181.

Under EBC, the 12th MDG is fully responsible for the total health care needs of its enrollees. The cost to the 12th MDG by not being able to provide a full continuum of health care services and having limited hours of availability results in the purchase of emergency and non-emergency inpatient and outpatient services from a combination of sources including other MTFs, and the civilian network. In the past it has been easy for an outpatient type MTF to "pass on" the cost of emergency and inpatient care costs to the local inpatient MTF. Under EBC this is no longer possible, as the outpatient facility must "pay" for these services. Although not able to provide emergency or inpatient care, the outpatient facility may be able to recapture some of the otherwise "non-emergent" care that is demanded after hours at other facilities.

Although not authorized to select its own enrollees, this study shows the 12th MDG the average total cost for each of its

types of enrollees, and are encouraged to directly market to those types of beneficiaries that it is the most capable of treating. If premiums were truly discretional to the MTF Commander at the time of enrollment, decisions to employ less costly, more available providers could be used to meet the demands of enrollees. Since readiness requirements for military providers exist and resource caps exist on the number and salaries of civilian and contractor hires, Commanders must make decisions on enrollment capacity within current resource thresholds.

Under EBC, the reward for treating non-enrollees is unfavorable to assuming the risk for and treating enrollees. Although in individual beneficiary groups it is financially favorable not to enroll them, across the entire mix of patient groups it is more favorable to treat enrollees vice non-enrollees. In the case of assuming the risk for an active duty Air Force female age 45-64, it is four times more favorable comparing that individual's $555 dollar yearly "profit" to the clinic vice a reimbursement of $135 for three visits from a non-enrollee.

The 12th MDG will be most successful under EBC by first fully enrolling its active duty population who generally demand care less intensively, followed by their family members. For all

patient categories, including those retirees and their families who choose to enroll with the 12th MDG, extending the number of primary care hours and thus the number of appointments available would not only enable the opportunity to expand enrollment, but possibly decrease the amount of purchase care costs from other MTFs in the same geographic vicinity.

Based on this study, and the results presented, the 12th MDG has ample opportunity for increasing its enrollment capacity and recapturing some of its purchased outpatient care by considering increasing the availability of its provider and support staff to its enrollees.

Conclusions

The Family Care Clinic does not have the current capacity to enroll 18,000 beneficiaries given resource availability and the requirement to assume full financial responsibility in a capitation resource constrained environment. Financing through capitation allocation will generally require MTF Commanders to increase their TRICARE Prime enrollment through higher clinic productivity, increased utilization management, and patient throughput to earn adequate premiums to support operations. Development of alternative health care delivery methods, and sound "provide or purchase" decisions will also be required to optimize scarce enrollment revenues and control the purchase of

care by PCMs. Success in a capitated environment will depend upon optimizing enrollment, reducing the costs per episode of care and purchased care per enrollee, marketing the benefits of TRICARE Prime enrollment, and satisfying enrollee needs through access to quality, cost-effective healthcare services so that MTF enrollees remain enrolled at the MTF.

Published research of health care simulation studies involving enrollment optimization is limited, and many results are proprietary and not available in the public domain. The bulk of simulation articles and case studies are presented at professional conferences which draw together both expert and novice users of computer simulation across many industries. With the growing number of simulation software products available and the increasing popularity of its use by health care professionals, this should result in a greater use of simulation and thus the number of published results that can be used for research and comparison.

The delivery of health care services now involves decisions of great complexity. Once the variables are quantified, decision science-based software can help healthcare executives provide services more effectively, and resources and capacity can be allocated more efficiently. Asking the right questions to get the appropriate numbers and configuring the data into an

appropriate structure is essential to the process of simulation. Knowing which numbers really matter and how they relate to the strategic health care delivery goals can also make a big difference in the outcome.

Simulation can be both prospective and retrospective, through multiple replications and evaluating incremental changes in the outcome, users can fine tune the input to maximize the outcomes. In service industries such as healthcare, incremental changes in staff utilization and capacity management can make a big difference in the difference between survivability and demise. The allocation of healthcare services is much like allocating production capacity in a manufacturing scenario where many products compete simultaneously for a limited resource. The simulation of a Family Care Clinic at the micro level does not account for other global variables which may have impact on enrollment. Interdependencies may exist by looking at several clinics within the same organization or within an integrated health care system at a macro level which provides a full continuum of care. Further simulation studies at both the micro and macro level must be done in order to determine these interrelationships.

Capacity management has been studied under the assumption that health care managers were primarily concerned with the

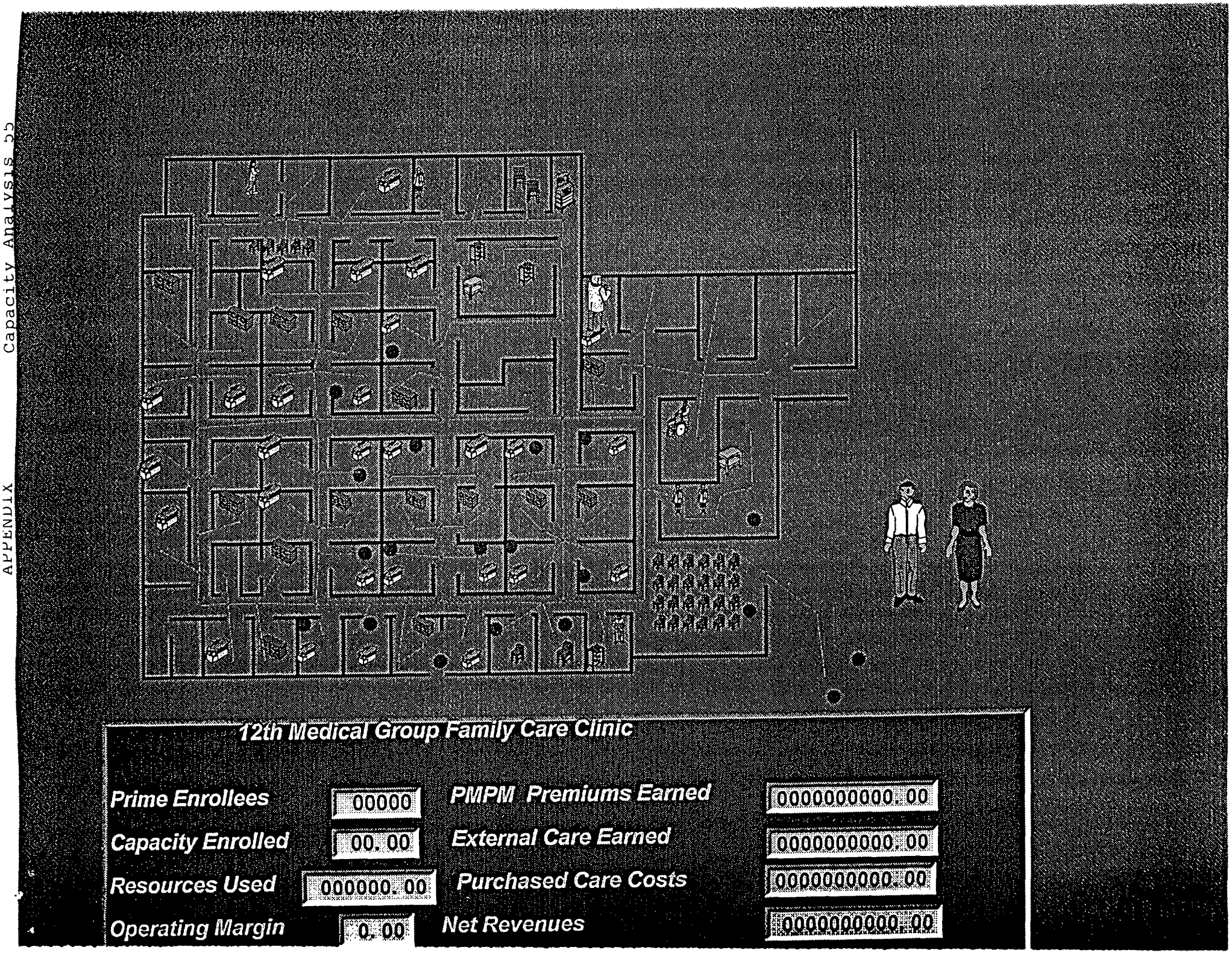
objectives of minimizing costs, maximizing resource utilization, and minimizing patient waiting time. Future research in capacity management should focus on the impact of capacity decisions on customer satisfaction, access to a full continuum of care, profitability, staffing mix, and market share. To remain competitive in a capitated environment, health care executives must engage in strategic planning to not only determine the appropriate allocation of resources and desired marketplace position, but also shift from a process-orientated approach to health care to the development of product lines and appropriate health care service mix so that profitability and market share can be measured. As the revolution of the health care industry continues with emphasis on increasing the quality and access to cost-effective care, health care executives should continue to look to the science of computer simulation. Computer simulation provides the health care executive with an additional objective decision tool on which to evaluate either the existing or planned changes in the delivery of health care before limited resources are expended.

Previous simulations of outpatient services facilities report that the percentage utilization of resources and locations are the primary indicators of under or excess clinic capacity, however, simulation to date has not been constrained by the

number of enrollees, enrollee capitated premiums, enrollee utilization rates, resource costs, or purchased care payments in order to determine optimum enrollment capacity. Provided that these conditions can be successfully simulated, MTF Commanders can use the results of this project to evaluate the effectiveness of their health care delivery process, the efficiency and effectiveness of their providers, and consider expanded or alternate uses for their resources and facilities.

For the MHS, enrollment based capitation represents another fundamental leap into the complex world of providing cost-effective, high quality care, and for many MTF Commanders will reflect their ability to operate in an environment similar to that faced by their commercial counterparts and the Managed Care Support Contractor. From a health care capacity perspective, the future challenges for health care executives will not be to balance diverse objectives and competing alternatives, rather it will be to strategically plan, shape, and integrate units of cost effective, high quality health care capacity within the existing health care delivery system to provide timely access to the demands of a defined patient population. To maximize scarce resources, respond to patient demand, and effectively utilize expensive capacity and resources, simulation has the potential to

offer solutions to the healthcare executive that markedly increase the accuracy, confidence and impact of their decisions.


12th Medical Group Family Care Clinic
Prime Enrollees
00000
Capacity Enrolled
00.00
Resources Used
000000.00
Operating Margin
0.00
PMPM Premiums Earned
0000000000.00
External Care Earned
0000000000.00
Purchased Care Costs
0000000000.00
Net Revenues
0000000000.00

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13. ABSTRACT *(Maximum 200 words)*

When implemented, Enrollment Based Capitation will change the manner that healthcare in the Military Health System is financed and delivered. Placing Military Treatment Facilities at capitated, financial risk will force Commanders and their staffs to become acutely familiar with the healthcare needs of their enrollees, and of their own process for delivering healthcare services. The Twelfth Medical Group is the Air Force's largest freestanding ambulatory clinic in the United States, currently enrolled at 63 percent of its estimated 18,000 enrollee capacity. This project simulates the operations of the Family Care Clinic and reports its financial and operational performance under capitation to identify the critical factors contributing to optimal enrollment. Current capacity was tested using simulation and found to be insufficient for 18,000 enrollees due to the availability of providers to deliver care. Alternative models revealed the additional resources required to support 18,000 enrollees. The simulation models and resulting analysis provides the Twelfth Medical Group a dynamic analytical tool to assist in determining optimal enrollment of the Family Care Clinic under Enrollment Based Capitation.

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